

WU: x varies directly
with y . If $x=10$
when $y=20$, write the
equation. Then find y
when $x=6$.

(Hint: Direct variation $y=kx$)

$$\begin{array}{l} y=kx \\ \boxed{y=2x} \end{array} \quad \frac{20}{10} = \frac{k(10)}{10} \quad \& \quad \begin{array}{l} y=2(6) \\ y=12 \end{array}$$
$$k=2$$

Inverse Variation

$$y = \frac{a}{x} \quad a \neq 0$$

① Classify inverse variation
(get y by itself)

Ex ~~$y = \frac{7}{x}$~~ $y = \frac{7}{x}$ yes. inverse variation

Ex ~~$y = x \cdot 4$~~ $y = 4 \cdot x$ No. direct variation

Ex $y = x + 3$ No. neither

② Write an inverse var. equation

If $y = 7$ when $x = 4$, write the inverse equation.

$$y = \frac{k}{x}$$

$$x \cdot y = \frac{k}{x} \cdot x$$

$$k = x \cdot y$$

$$k = 4 \cdot 7 = 28$$

$$y = \frac{28}{x}$$

✓✓✓✓✓

$$4 \cdot 7 = \frac{k}{4} \cdot 4$$

$$y = \frac{28}{-2} = (-14)$$

Then, find y when $x = -2$

Ex) $x = 4$ $y = 3$. write inverse equation.
solve y when $x = -2$

$$y = \frac{9}{x} = \frac{k}{x}$$

$$k = 4 \cdot 3 = 12$$
$$\boxed{y = \frac{12}{x}}$$

$$y = \frac{12}{-2} = \textcircled{-6}$$

Joint Variation

y varies with x and z , write the equation of variation, if $x=3$, $y=5$ and $z=20$.

① Write general equation w/ a constant in it. $y = a \cdot x \cdot z$

② Plug in variables to solve for constant $(5) = a(3)(20)$
 $\frac{5}{60} = \frac{\cancel{60} \cdot a}{\cancel{60}}$

③ Write equation w/ solve constant plugged in $a = \frac{1}{12}$ or .0833

$$\boxed{y = \frac{1}{12} x \cdot z}$$

Solve for y when $x=4$ and $z=2$

$$y = \frac{1}{12} (4)(2)$$

$$y = \frac{1}{12} \cdot 8 = \boxed{\frac{2}{3} \text{ or } .6\bar{6}}$$

P varies with q, r, t, v, a
 x .

Write the equation if $q=2, r=1, t=3$

constant



$$P = m \cdot q r t v a x$$

$$a=4, v=5$$

$$\text{and } x=7$$

$$P=10$$

$$10 = m(2)(1)(3)(5)(4)(7)$$

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3-10

12-15

20, 21

24-26

x	y

inverse
 $k = x \cdot y$

direct
 $k = \frac{y}{x}$

$$y = \frac{\#}{x} \leftarrow \text{inverse}$$

$$y = \# \cdot k \leftarrow \text{direct}$$

$$y = \frac{x}{2} = \frac{1}{2} \cdot x$$